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STEWART L. UDALL, SECRETARY
Fish and Wildlife Service, Clarence F. Pautzke, Commissioner
Bureau of Commercial Fisheries, Donald L. McKernan, Director

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CENTOLLA INDUSTRY IN TIERRA DEL FUEGO

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1/ Information supplied by Ole J. Heggem, Fisheries Technician, Agency for International Development, Chile.

SUMMARY

These notes were compiled as supplementary data to the November 1961-January 1962 Centolla season. Previously, preliminary notes were prepared regarding the Centolla Industry of Tierra del Fuego from data collected during the prevalent fishing season, November 1961 - January 1962. The information presented in this paper provides additional data concerning the possibility of the fishery from April to June. During this period trial fishing efforts were made with tangle nets and with Alaskan-type King Crab traps. The vessel, M/V WALTER, length overall approximately 45 feet, equipped with a Strausberg trawl winch and a vertical gurdy for hauling tangle nets was used during this latter period. In addition a brief trial was made with a German Herring trawl.

In general, it was noted that:

1. The females were hard shelled and in good condition. The catch of males tended to be soft shelled in legs and claws, relatively light in weight, and generally of large size. Almost all females were carrying eggs. The few exceptions usually had a parasite slug and no eggs were observed in these cases. Another exception was noted in those females caught June 12th with the trawl and on June 13th near Cape Monmouth.

2. The catch by tangle nets was significantly smaller (possibly by two thirds) than the catch observed in tangle nets during the fishing season November - January.

3. The traps did not fish well. Of six traps in the water, only an occasional Centolla was found in the trap. The traps were all set in the area North of Point Chilota where males predominated. The depth of setting, from 25 fth. to 60 fth. did not appear to affect the catch result, with the exception of trap #9 set at 60 fathoms which caught one male and twenty six females on June 19.

4. Weather conditions usually consisted of a period of calm, possibly one week, with another period of four to five days of storm. The short period of daylight limited the working day at sea from 08:00 a.m. to 05:00 p.m. since the channel was not marked. Accomodations aboard the vessel were sufficient for only two persons. Therefore fishing efforts were limited to daylight hours from Porvenir harbor.

5. Commercial fishing for Centollas with traps, trawls, or tangle nets does not appear feasible in the Porvenir during the period of observation from February to the end of June, due to the small catch and poor quality of male Centollas at this time.

INTRODUCTION AND BACKGROUND

The first phase of the Centolla study-program consisted of the collection of catch data off Porvenir from October 31, 1961 to January 25, 1962. Towards the end of January, the average catch of Centolla per unit of tangle net, (100 meters length by six meshes deep), fell to 18 commercial male Centolla, as against 38 in November and 44 during December. It was therefore decided to initiate further studies during the off season to determine whether this trend continued, whether the Centolla could be taken in greater quantities in deeper waters, and whether commercial fishing by traps would be feasible.

Considerable misfortune was experienced in preparing the M/V WALTER under charter for these studies. The vessel was reported ready in early March. Personnel arrived at Porvenir in mid-March ready to start work. The vessel, however, was not ready. It was finally ready to leave Punta Arenas but broke down again prior to departure, with the failure of the engine. By April 19th the vessel was again made ready and left Punta Arenas for Porvenir. The vessel then worked from 20 April, weather permitting, from Porvenir. On June 7th the vessel ran aground at near low tide, while entering the channel to Porvenir during the night. As the tide receeded, the vessel turned on her side, and filled with water with the rising tide. This necessitated another period, to June 19th, in order to dismantle the engine effect necessary repairs, and await the arrival of a new vessel captain. During the period prior to grounding, seven Juegos of ten nets each were set, two by a small boat, prior to arrival of the M/V WALTER. In addition a few of the four traps in the water were occasionally lifted to note whether Centolla had entered.

After the grounding, a more experienced vessel captain was obtained. Another week was lost awaiting his arrival, May 18th. A period of time was necessary to completely clean the vessel, fabricate a net chute, and repair all previously set nets after that date. In addition, two complete days of perfect weather were lost looking for a Juego set prior to the grounding. Fishing operation then began on May 22 and continued as weather permitted until June 14th.

Fishing trials were made off Point Chilota to seven miles north and in Santa María Bay. Nets were set in depths from 25 fathoms to 40 fathoms.

During the period May 22 to June 14th, the vessel lifted three Juegos north of Puerto Palos and four south of Puerto Palos. One day was spent trawl fishing with a German Herring trawl north of Puerto Palos on June 13.

After June 18th, the vessel was to continue fishing operations with the Herring trawl, for Centolla, as long as weather conditions or other factors would permit.

Oceanographic studies were programmed with the M/V WALTER. Due to the erratic availability of the vessel, no systematic program was carried to completion. Personnel from the University of Concepción worked for a short time prior to the grounding and completed a few stations between Porvenir and Bahia Inútil, until the subsequent grounding suspended further oceanographic operations.

WEATHER CONDITIONS

In general, weather conditions were not much more adverse from April to mid June than during the summer period and present Centolla season November to mid January. Strong winds were generally not as prevalent during the April - mid June period. With moderate easterly winds, traps and nets could usually be worked. With westerly winds, the long stretch of open water in the Strait of Magellan made working conditions for a small vessel difficult in a moderate wind. There were frequent periods of cold weather, with the temperature slightly below zero degrees centegrade. The surface water temperature however remained close to + 6° C.

During periods of cold weather and wind it is difficult to work the tangle nets. After the nets are lifted, they must be picked clean of Centollas, usually ashore. Then each net must be placed on drying racks, cleaned of debris, and repaired. This must be done without gloves or with only one gloved hand. It becomes difficult to work with cold numb hands for long periods of time.

The short period of daylight presents another adverse factor to operations at this time of year. From May, it is light only from about 08:00 a.m. to 05:00 p.m., during June, July and August from 08:30 a.m. to 04:30 p.m. The Porvenir channel must be entered during periods of daylight or good visibility since it is very shallow in portions, with not more than five feet draft in certain parts, during low tides. The channel is not lighted; it has many bends and sand bars. Periods of calm are usually encountered during early morning and late afternoon. Fishing activity is therefore limited with a small vessel not capable of staying outside the harbor overnight or not having sufficient range to reach other harbors.

COLLECTION OF DATA

During the early period of fishing an effort was made to note the catch per net and the position of the net in the Juego. The nets were marked with wooden discs and measured on lead line and cork line. Later the tags became entangled and lost. Lead lines and cork lines were broken and often shortened while repaired. Also, there was not sufficient personnel on hand to record the data while fishing. Data collection was therefore later limited to counting males and females, measuring the carapace length and weighing each sample. Notes were made as to females with and without eggs. The weights were taken with a spring scale, reading accurately to approximately 25 grams. Measurements were made with a vernier caliper to the nearest millimeter.

There were two echo sounders aboard, one fish finder visual-type and the other a small recording Bendix. Both echo sounders were in operative after May 25th. Soundings then had to be made by hand line.

FISHING OPERATIONS

Trawling

An otter trawl was rigged on the M/V WALTER for a brief trial on June 12th. The vessel's engineer had worked with this trawl previously supervising its installation and use. Other personnel of the vessel, the Captain and three fishermen, had not seen a trawl in use before. The first trial, conducted 7 Kms. North of Puerto Palos in about 35 fathoms of water, trawl fished for one hour. The catch consisted of the following:

Females: 14 (1 with eggs)

Males : 23 (9 of commercial size, over 100 mm.)

The net contained approximately two tons of bottom growth and two tons of very small langostinos, of little value due to their small size. The Centollas were in poor conditions, many crushed by the weight of the trash. The others seemed very soft of carapace and legs. Further fishing efforts are being carried on with this trawl. It may be possible to locate Centollas in greater depths with firm carapace and also locate grounds that are more clear of underwater growths.

Tangle Nets

The cotton tangle nets with light manila lead and float lines (the type locally in use) were not found suitable for use with the M/V WALTER, during other than periods of very calm seas. With any motion of the vessel the lead and float lines tended to part easily. The nylon lead and float lines were found more resistant to the heavy strain imposed by the lead line and the vessel's motion. The white nylon nets were attacked more frequently by starfish than those of green color. The green colored nets were relatively free of starfish.

A net gurdy was installed aboard the M/V WALTER to retrieve the tangle nets. This worked well. However, in windy weather the nets often tended to wrap around the gurdy shaft. This could be avoided by installing a ply-wood surface from the rail to the gurdy. It was not done since the vessel shifted to trawl fishing by June 12.

The leads used on the local nets were about 8 cm. x 1.5 cm. These leads tended to bend and open up when the lead line was hauled around the gurdy with a heavy strain. Shorter leads, about 4 cm. x 1.5 cm. were found more suitable.

The glass floats were at first rejected by the local fishermen as not suitable and causing tangles. With further use, the glass floats were found as easy to handle as the cork floats. There is no old webb available in this area for wrapping the floats however, and the expense of glass floats (about $0.10 each, made locally in Santiago) is nearly the same as plastic floats.

Tangle nets were set in Juegos of ten nets each, usually all nylon. One Juego consisted of ten cotton nets. The cotton nets were 90 meters in length of float line, twelve inch stretch-mesh. The nylon nets were of twelve inch stretch-mesh and float-line length varied from 70 meters to 90 meters.

The use of a relatively heavy vessel such as the M/V WALTER, and a capstan-type gurdy for hauling tangle nets imposes a heavy strain on the lead line and cork line when the vessel is rolling and the fishing depth is over 35 fathoms. This necessitates careful handling of the vessel to keep the bow in the wind and minimize rolling. Local personnel are acquainted with the use of small open power boats, and hauling nets by hand. The use of larger vessels, even of 45' in length requires hiring a fishing captain with a certificate from Punta Arenas and training him in the fishing operation.

Traps

Fishing results with the Alaska-type King Crab trap were very disappointing. All traps were set north-west of Puerto Palos near Porvenir in depths of 20, 25, 30, 36, 40 and 60 fathoms of water. (See sketch of trap in Appendix). The traps were baited with sheeps head, mussels, sheep entrails, and fish (Smelt). Four traps were set April 8 and two (#9 and #10) May 26. The traps were lifted occasionally and the bait supply replenished.

The bait was placed in a net sack in the center of the trap. Later (June 7) two sheepsheads were used as bait, one being placed near each tunnel entrance. The trap (#2) with fresh fish as bait, (Smelt) caught one male and the remains of three dead males on May 26 in 25 fathoms of water. Trap number 9, set in sixty fathoms was lifted on June 19 and found to contain one male and twenty six female Centollas.

Although the traps fished unsuccessfully at this time, it may have been due to the time of year, location, depth of water or a larger amount of marine organisms in the water which rapidly consumed the bait. Trap trials should be continued in other times of the year to fully complete this study. In addition one of the present traps should be modified to a pyramid type with the opening at the top, for comparison trials.

SUMMARY OF CATCH DATA

Date	Area	Total	Males	Females	With eggs
April 20	Puerto Chilota	50	23	27	19
	" "	173	114	59	42
	" "	14	7	7	5
April 30	" "	135	82	53	48
May 5	" "	218	106	112	110
May 25	Parafina	19	12	7	7
May 26	Puerto Chilota	127	80	47	47
May 29	Parafina	157	98	59	--
May 31	Puerto Chilota	45	41	4	3
June 6	Cape Monmouth	255	58	197	190
June 8	Puerto Chilota	133	117	16	12
June 13	Cape Monmouth	138	78	60	6
June 12	Puerto Chilota	62	43	19	1 (Trawl)
		1526	859	667	490

The average catch per net was 11.2 Centollas per net as against 33.3 during the season. The 33.3 is based on commercial males only. The 11.2 consisted on males and females and undersized Centollas.

TRAP DATA

Trap N°	Position	Depth	Fishing Duration	Bait	Catch Male	Catch Female
1	3 mi N.W Pt. Chilota	30 fth.	April 8-June 7	Shell Fish Smelt Sheephead	3	0
2	" " " "	25 fth.	April 8-June 12	Sheephead	4	0
3	" " " "	36 fth.	April 8-June 12	Sheephead Smelt	0	0
8	" " " "	20 fth.	April 8-June 7	Smelt	0	0
9	" " " "	60 fth.	May 26-June 7	Sheephead	0	0
10	" " " "	40 fth.	May 26-June 7	Shell Fish	0	0

COMPARISON OF ARITHMETIC MEAN

April - June 1962

Females:

Length of Carapace $\frac{30077}{311} = 96.7$ mm.

Weight $\frac{181692}{311} = 584.2$ grm.

Males:

Length of Carapace $\frac{48044}{432} = 111.2$ mm.

Weight $\frac{457583}{432} = 1059.2$ grm.

November - January

Male:

Length of Carapace $\frac{479776}{4312} = 111$ mm.

Weight $\frac{4402395}{4312} = 897.9$ grm.

NOTE:

In the November 1961 - January 1962 notes previously compiled, the arithmetic mean weight of 4312 commercial samples is given as 970 grams from the Length Weight curve. This is in error and the weight of 897.9 grams from calculation should be considered as more accurate.

CONCLUSIONS

In general the period from February to the end of June does not seem to provide much possibility for Centolla fishing in the Porvenir area although the weather is favorable. From the relatively few samples taken it is evident that the male Centolla are soft, at least in the legs and claws. In addition, the catch per unit of gill net is a great deal less, possibly one third of that obtained during the season November-January. The nets must also remain much longer in the water to obtain this catch.

The cannery manager stated that the Centolla during the April-June period contained less meat than during the November-December season. This is not substantiated by the data on hand which shows a mean weight of 898 grams for 4312 male Centollas measured during the November-December season, with a mean carapace length of 111 millimeters. These were commercial Centollas, for use in the cannery, the undersized having been discarded beforehand. During the April-June period, random samples were taken of the entire catch. The Arithmetic Mean weight of 432 male Centolla measured and weighed during this period was 1059 grams, with a mean carapace length of 111.4 millimeters.

PARTICIPANTS

Ministerio de Agricultura, Dirección de Agricultura y Pesca, Depto. de Pesca y Caza.

1. Sr. Sergio Carvajal, Asesor de Pesca
2. Sr. Ismael Barrera, Laborante
3. Sr. Mario Arancibia, Laborante

Universidad de Concepción, Instituto Central de Biologia, Depto. de Zoologia.

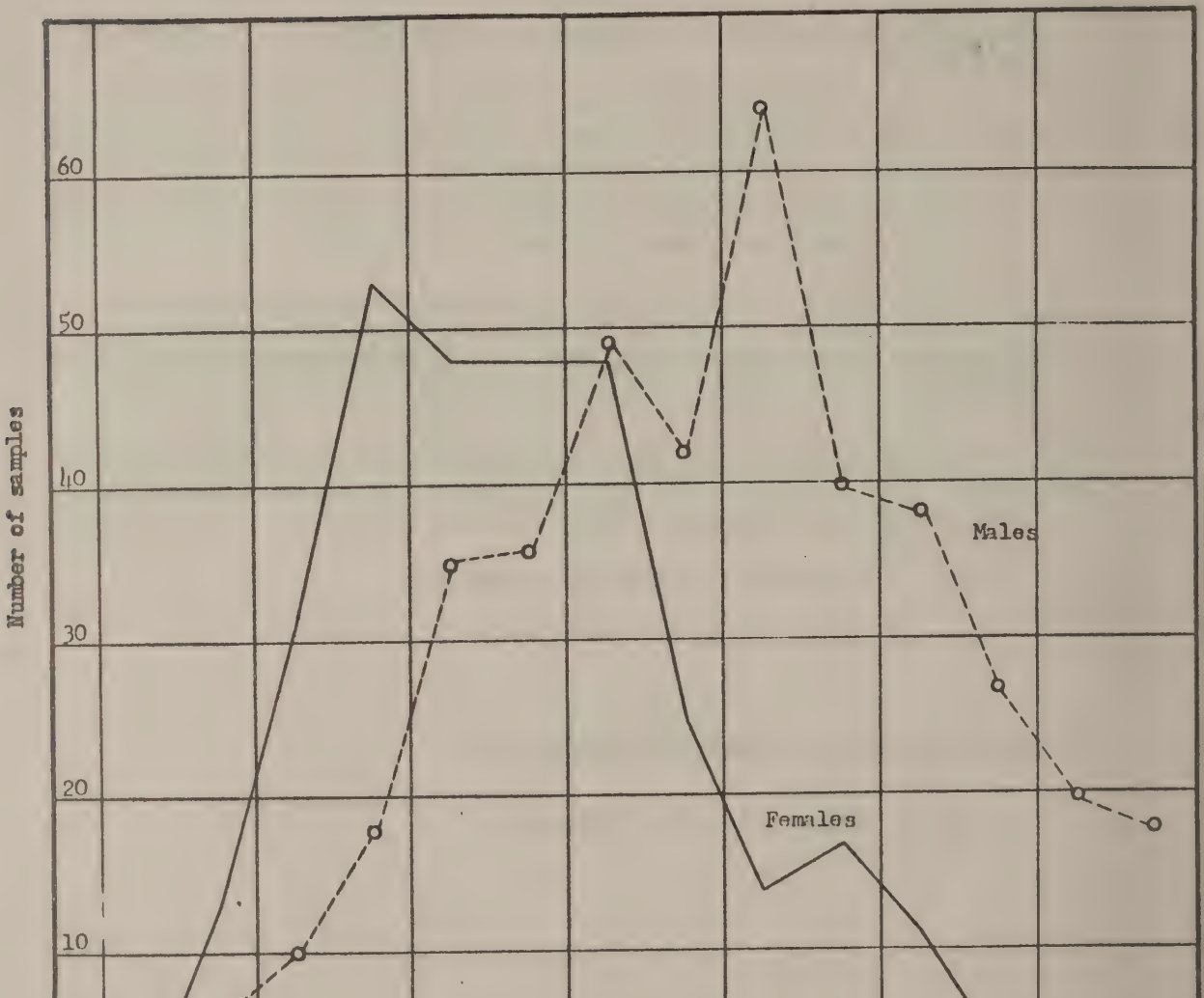
1. Sr. José Stuardo, Jefe Sección Zoología
2. Sr. Ariel Gallardo, Instructor Jefe
3. Sr. Lisandro Chuecas, Instructor Jefe
4. Sr. Ivan Solis, Instructor Jefe

Agency for International Development, Chile

Ole J. Heggem, Fisheries Technician

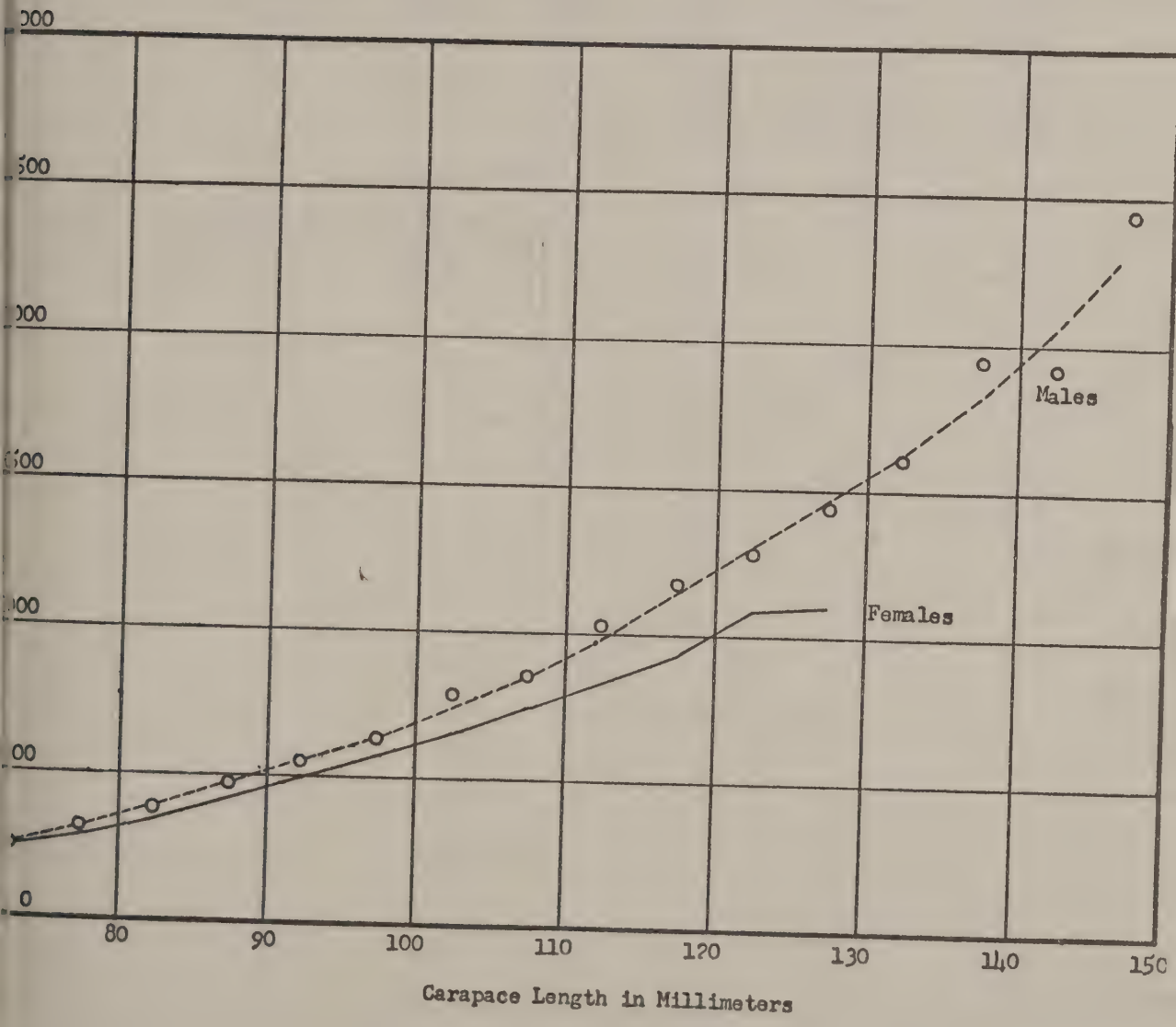
Graph I

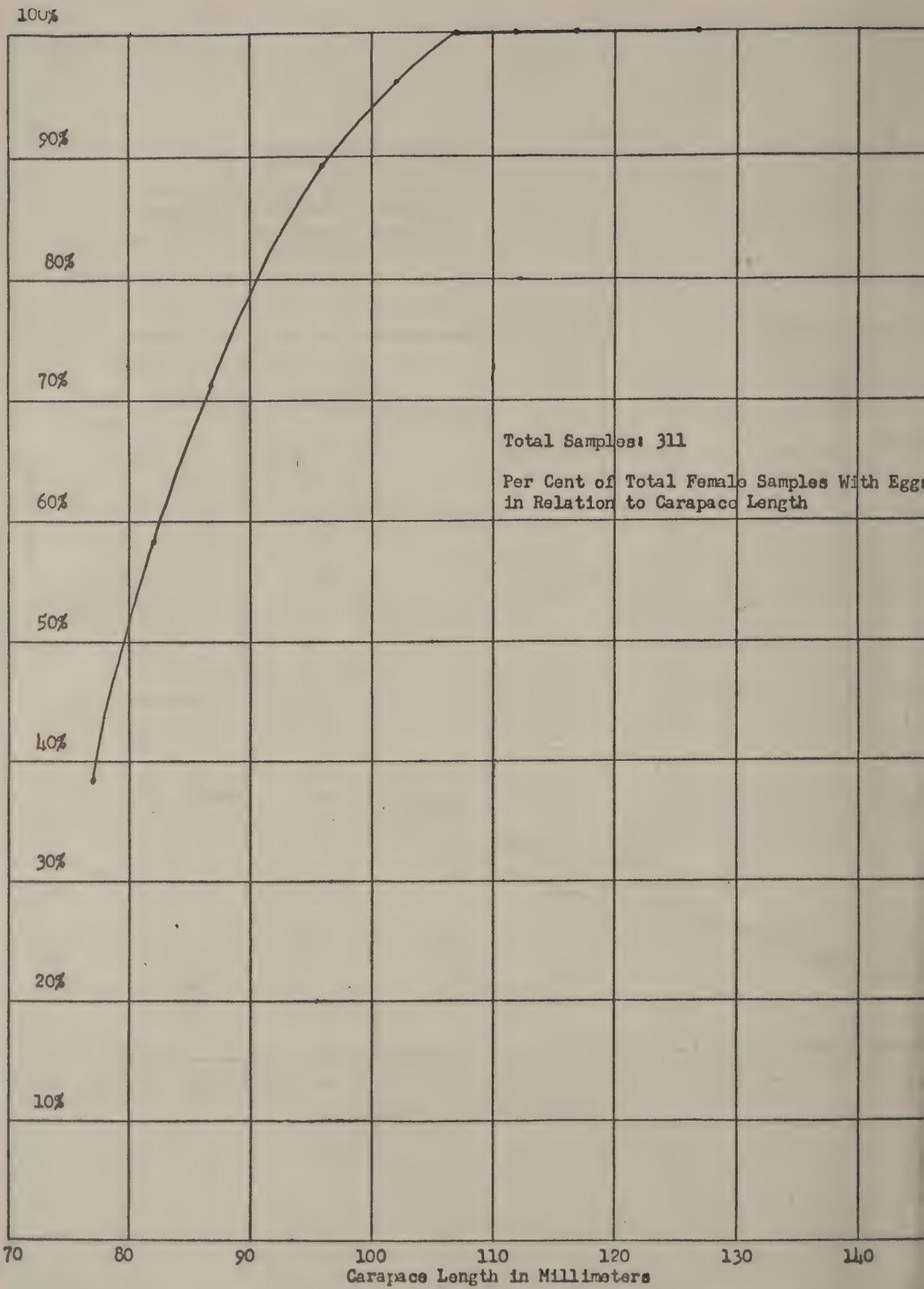
LENGTH FREQUENCY
Random Sample 420 male centolla
311 female centolla
Porvenir, May 25 - June 13, 1962
Grouped in Intervals of 5cm.carapace lengt



Graph 2

Length-Weight Curve
Random Samples
May 25 - June 13 1962, Porvenir
Grouped in 5 mm Carapace Length
311 Female Centollas
420 Male Centollas




100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
Total Samples: 311
Per Cent of Total Female Samples With Eggs
in Relation to Carapace Length
70
80
90
100
110
120
130
140
Carapace Length in Millimeters

RELATION OF CARAPACE LENGTH TO EGGS

Carapace length in millimeters	Total Samples	Samples with eggs	% of Total	Samples without eggs	% Total
77	13	5	38.4	8	61.5
82	31	18	58	13	41.9
87	53	38	71.6	15	28.3
92	48	39	81.2	9	18.7
97	48	42	87.5	6	12.5
102	48	46	95.8	2	4.2
107	25	25	100	0	0
112	14	14	100	0	0
117	17	17	100	0	0
122	11	10	90.9	1	9.0
127	3	3	100	0	0

LENGTH - WEIGHT

Male Centolla - PORVENIR - May 25-June 13, 1962

Carapace Length in Millimeters	Average Weight in grams	Number of Samples
65	400	1
71	250	1
76	275	2
79	362	4
80	300	1
81	458	5
82	300	1
83	300	1
84	475	2
85	437	4
86	425	2
87	466	3
88	537	4
89	502	5
90	575	2
91	537	7
92	557	11
93	582	7
94	578	8
95	579	11
96	644	8
97	637	3
98	644	7
99	667	7
100	708	13
101	668	8
102	812	12
103	833	10
104	947	6
105	843	7
106	835	7
107	858	11
108	835	10
109	896	7
110	975	17
111	1029	14
112	1029	12
113	1050	8
114	1085	13
115	1164	11
116	1170	10
117	1263	4
118	1094	9
119	1282	6
120	1365	8

Length Weight Male Centolla - Porvenir. (Cont.)

Carapace Length in Millimeters	Average Weight in grams	Number of Samples
121	1310	5
122	1284	9
123	1307	8
124	1286	8
125	1317	9
126	1408	6
127	1417	3
128	1581	6
129	1544	3
130	1550	7
131	1590	3
132	1578	5
133	1900	4
134	1775	1
135	1904	4
136	2066	2
137	1950	2
138	1868	7
139	2200	3
140	1625	2
141		
142	2075	4
143	1850	2
144	2200	1
145	2350	1
146		
147	2200	1
148		
149	2800	1
150	2000	1
151	1850	1
154	2250	1

LENGTH WEIGHT

MALE CENTOLLA

Porvenir - May 25 - June 13, 1962

Carapace Length in Millimeters	Average Weight in Grams	Group Total	Group Average	Number of Samples	Number of Samples in Group
65	400	400	400	1	1
71	250	250	250	1	1
75					
76	275			2	
77		637	318		6
78					
79	362			4	
80	300			1	
81	458	1833	366	5	10
82	300			1	
83	300			1	
84	475			2	
85	437			4	
86	425	2367	473	2	18
87	466			3	
88	537			4	
89	502			5	
90	575	2829	565	2	
91	537			7	35
92	557			11	
93	582			7	
94	578			8	
95	579			11	
96	644	3171	634	8	36
97	637			3	
98	644			7	
99	667			7	

LENGTH WEIGHT MALE CENTOLLA (Cont.)

Carapace Length in Millimeters	Average Weight in Grams	Group Total	Group Average	Number of Samples	Number of Samples in Group
100	708			13	
101	668	3968	793	8	49
102	812			12	
103	833			10	
104	947			6	
105	843			7	
106	835	4267	853	7	42
107	858			11	
108	835			10	
109	896			7	
110	975			17	
111	1029			14	
112	1029			12	
113	1050	5168	1033	8	64
114	1085			13	
115	1164			11	
116	1170	5973	1194	10	
117	1263			4	40
118	1094			9	
119	1282			6	
120	1365			2	
121	1310	6552	1310	5	38
122	1284			9	
123	1307			8	
124	1286			8	
125	1317			9	
126	1408	7267	1453	6	30
127	1417			3	
128	1581			7	
129	1544			5	
130	1550			7	
131	1590	8393	1678	5	25
132	1578			7	
133	1900			4	
134	1775			2	
135	1904			5	
136	2066			3	
137	1950			4	
138	1868	9988	1997	8	23
139	2200			3	

LENGTH WEIGHT MALE CENTOLLA (Cont.)

Carapace Length in Millimeters	Average Weight in Grams	Group Total	Group Average	Number of Samples	Number of Samples in Group
140	1625			2	
141		7750	1937		9
142	2075			4	
143	1850			2	
144	2200			1	
145	2350			1	
146					
147	2200	7350	2450	1	3
148					
149	2800			1	
150	2000	6100	2033	1	
151	1850			1	3
154	2250			1	

LENGTH WEIGHT

Female Centolla - Porvenir - May 25-June 13, 1962

Carapace Length in Millimeters	Weight in grams	Number of Samples	With Eggs	Without Eggs.
75	250	1	-	1
76	300	2	1	1
77	350	2	-	2
78	283	3	-	3
79	294	5	4	1
80	333	6	3	3
81	360	5	2	3
82	400	3	2	1
83	378	9	5	4
89	400	8	6	2
85	433	9	4	5
86	393	7	6	1
87	414	7	5	2
88	429	14	10	4
89	452	16	13	3
90	497	10	8	2
91	475	10	8	2
92	504	12	10	2
93	520	5	3	2
94	536	11	10	1
95	554	12	10	2
96	530	9	8	1
97	556	9	7	2
98	545	10	9	1
99	584	8	8	-
100	637	11	10	1
101	661	9	8	1
102	635	12	12	-
103	694	8	8	-
104	694	8	8	-
105	739	7	7	-
106	742	3	3	-
107	704	7	7	-
108	825	2	2	-
109	741	6	6	-
110	800	4	4	-
111	738	4	4	-
112	800	3	3	-
113	---	-	-	-
114	833	3	3	-
115	920	5	5	-
116	883	3	3	-
117	1000	2	2	-
118	933	3	3	-

Length Weight - Female Centolla - Porvenir (Cont.)

Carapace Length in Millimeters	Weigth in Grams	Number of Samples	With Eggs	Without Eggs
119	975	4	4	-
120	1025	2	1	1
121	1112	4	4	-
122	1150	1	1	-
123	1000	1	1	-
124	1142	3	3	-
125	950	1	1	-
126	-	-	-	-
127	1200	1	1	-
128	1150	1	1	-

LENGTH WEIGHT

FEMALE CENTOLLA

Porvenir - May 25 - June 13, 1962

Carapace Length in Millimeters	Average Weight in Grams	Group Total	Group Average	Number of Samples	Number of Samples in Group
75	250	1477	295	1	
76	300			2	13
77	350			2	
78	283			3	
79	294			5	
80	333			6	
81	360	1871	374	5	31
82	400			3	
83	378			9	
84	400			8	
85	433	2121	424	9	
86	393			7	53
87	414			7	
88	429			14	
89	452			16	
90	497			10	
91	475	2532	506	10	48
92	504			12	
93	520			5	
94	536			11	
95	554			12	
96	530	2769	553	9	48
97	556			9	
98	545			10	
99	584			8	
100	637			11	
101	661	3321	664	9	48
102	635			12	
103	694			8	
104	694			8	
105	739			7	
106	742	3751	750	3	25
107	704			7	
108	825			2	
109	741			6	

LENGTH WEIGHT FEMALE CENTOLLA (Cont.)

Carapace Length in Millimeters	Average Weight in Grams	Group Total	Group Average	Number of Samples	Number of Samples in Group
110	800			4	
111	738	3171	792	4	14
112	800			3	
113					
114	833			3	
115	920			5	
116	883	4711	942	3	17
117	1000			2	
118	933			3	
119	975			4	
120	1025			2	
121	1112	5429	1085	4	11
122	1150			1	
123	1000			1	
124	1142			3	
125	950			1	
126		3300	1100		3
127	1200			1	
128	1150			1	
129					

MALES

RANDOM SAMPLES OF CENTOLLAS

Tangle Net Catch

PORVENIR - May 25 - June 13, 1962

Carapace length in millimeters	Number Specimen	Percent of Total	Weight Average	Mid Point	Carapace Length f (x)	Weight f (x)
70 - 74	1	.2	250	72	72	250
75 - 79	6	1.4	318	77	462	1908
80 - 84	10	2.3	366	82	820	3660
85 - 89	18	4.1	473	87	1566	8514
90 - 94	35	8.1	565	92	3220	19775
95 - 99	36	8.3	633	97	3492	22788
100 -104	49	11.3	793	102	4998	38857
105 -109	42	9.7	853	107	4494	35826
110 -114	64	14.8	1033	112	7168	66112
115 -119	40	9.2	1194	117	4680	47760
120 -124	38	8.8	1310	122	4636	49780
125 -129	30	6.9	1453	127	3810	43590
130 -134	25	5.8	1678	132	3300	41950
135 -139	23	5.3	1997	137	3151	45931
140 -144	9	2.1	1937	142	1278	17433
145 -149	3	.7	2450	147	441	7350
150 -154	3	.7	2033	152	456	6099
T O T A L	432				48044	457583

$$\bar{X} = \frac{E\, f(x)}{N}$$

$$\bar{X} = \frac{48044}{432} = 111.2 \text{ mm mean carapace length}$$

$\bar{X} = \frac{457583}{\quad}$ = 1059.2 grams mean weight

Tangle Net Catch

PORVENIR - May 25-June 13, 1962

Carapace length in millimeters	Number Specimen	Percent of Total	Weight Average	Mid Point	Carapace length f (x)	Weight f (x)
75 - 79	13	4.2	295	77	1001	3835
80 - 84	31	10.0	374	82	2542	11594
85 - 89	53	17.0	424	87	4611	22472
90 - 94	48	15.4	506	92	4416	24288
95 - 99	48	15.4	553	97	4656	26544
100 -104	48	15.4	664	102	4896	31872
105 -109	25	8.0	750	107	2675	18750
110 -114	14	4.5	792	112	1568	11088
115 -119	17	5.5	942	117	1989	16014
120 -124	11	3.5	1085	122	1342	11935
125 -129	3	1.0	1100	127	381	3300
TOTAL	311				30077	181692

Arithmetic Mean $\bar{X} = \frac{E\, f(x)}{N}$

$\bar{X}$ = Arithmetic Mean

E = Sum

f = Number of samples in group

(x) = Midpoint of group, or average weight of group

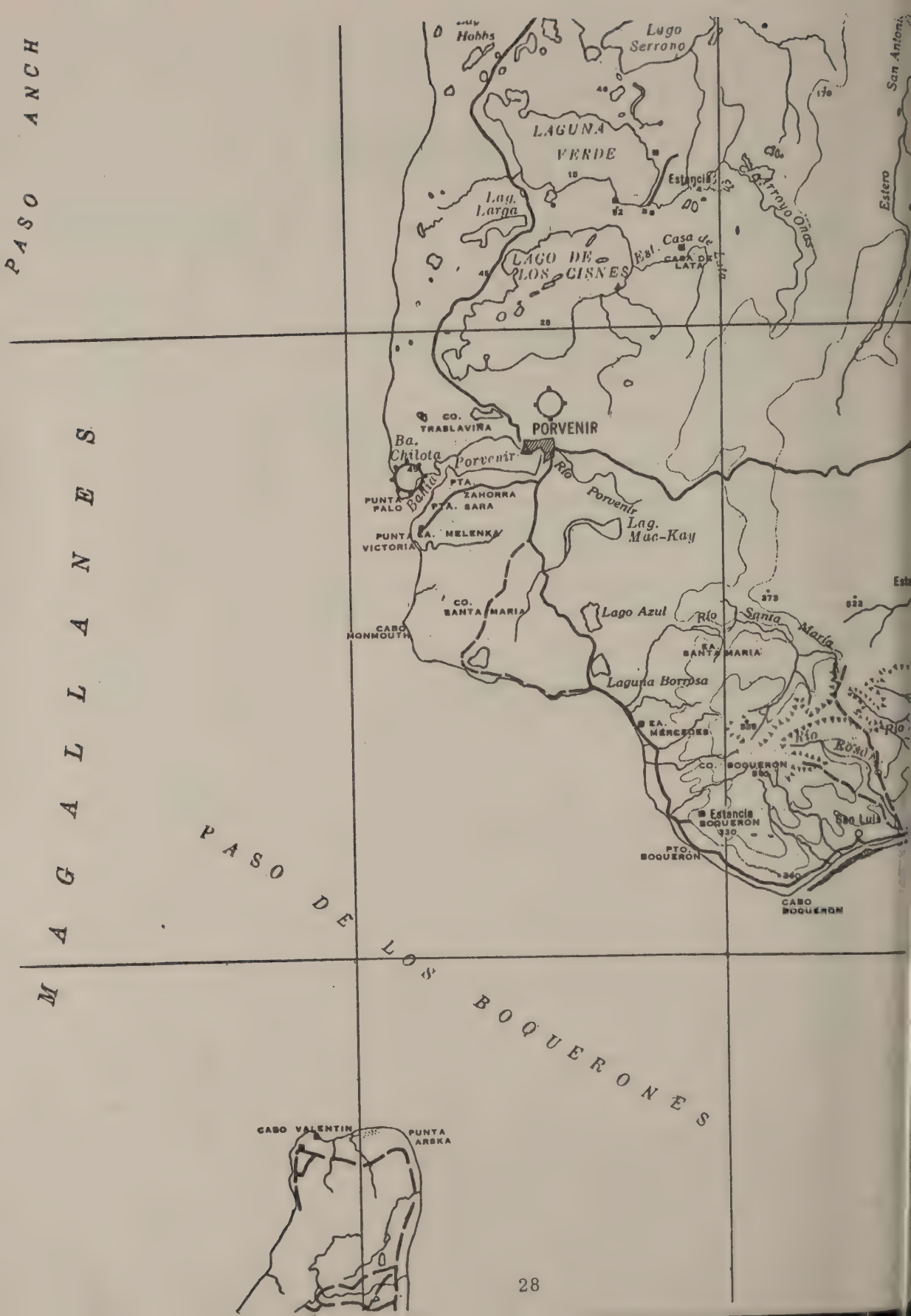
N = Total number of samples

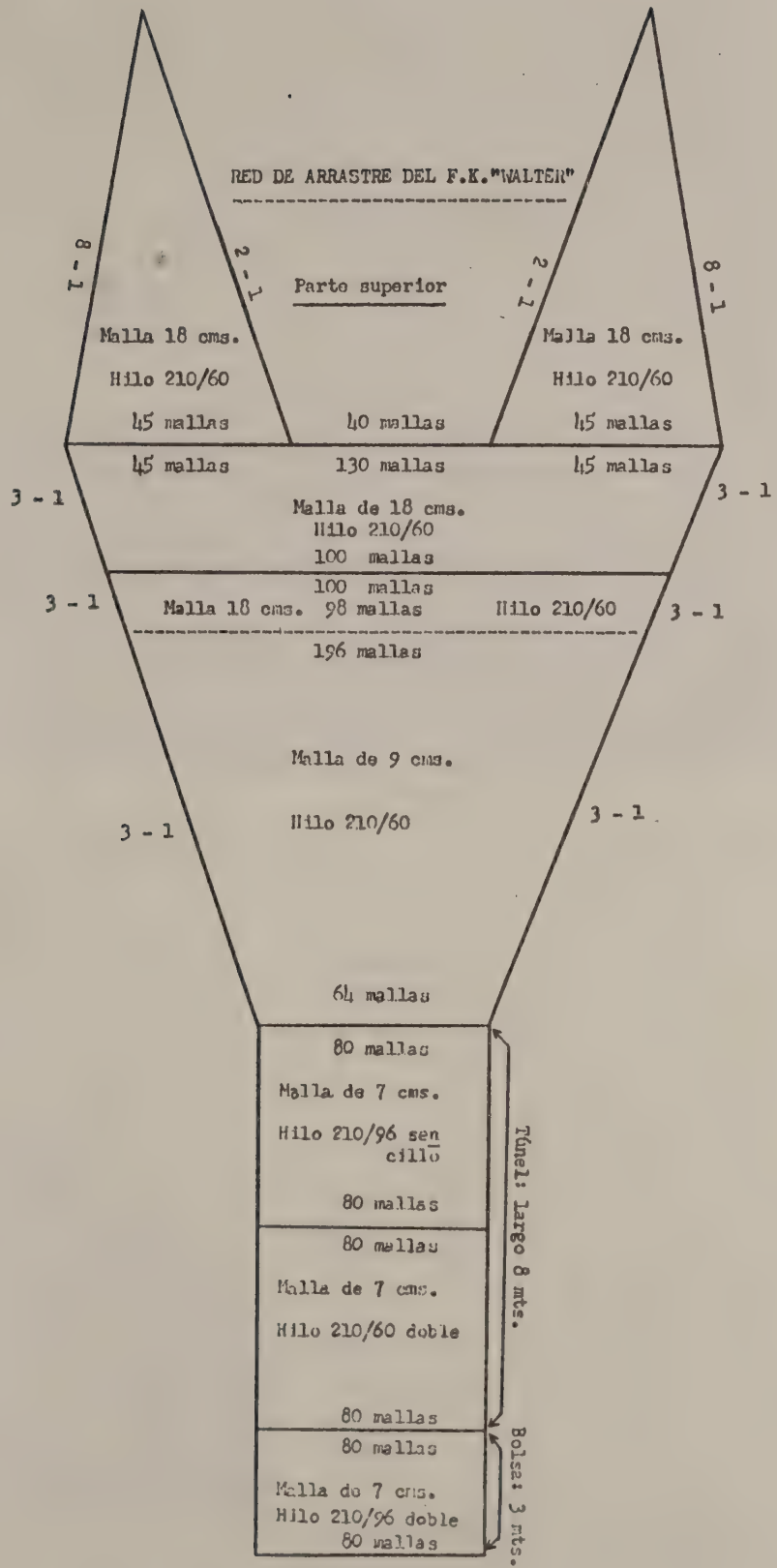
$\bar{X} = \frac{30077}{311}$ = 96.7 mm mean carapace length

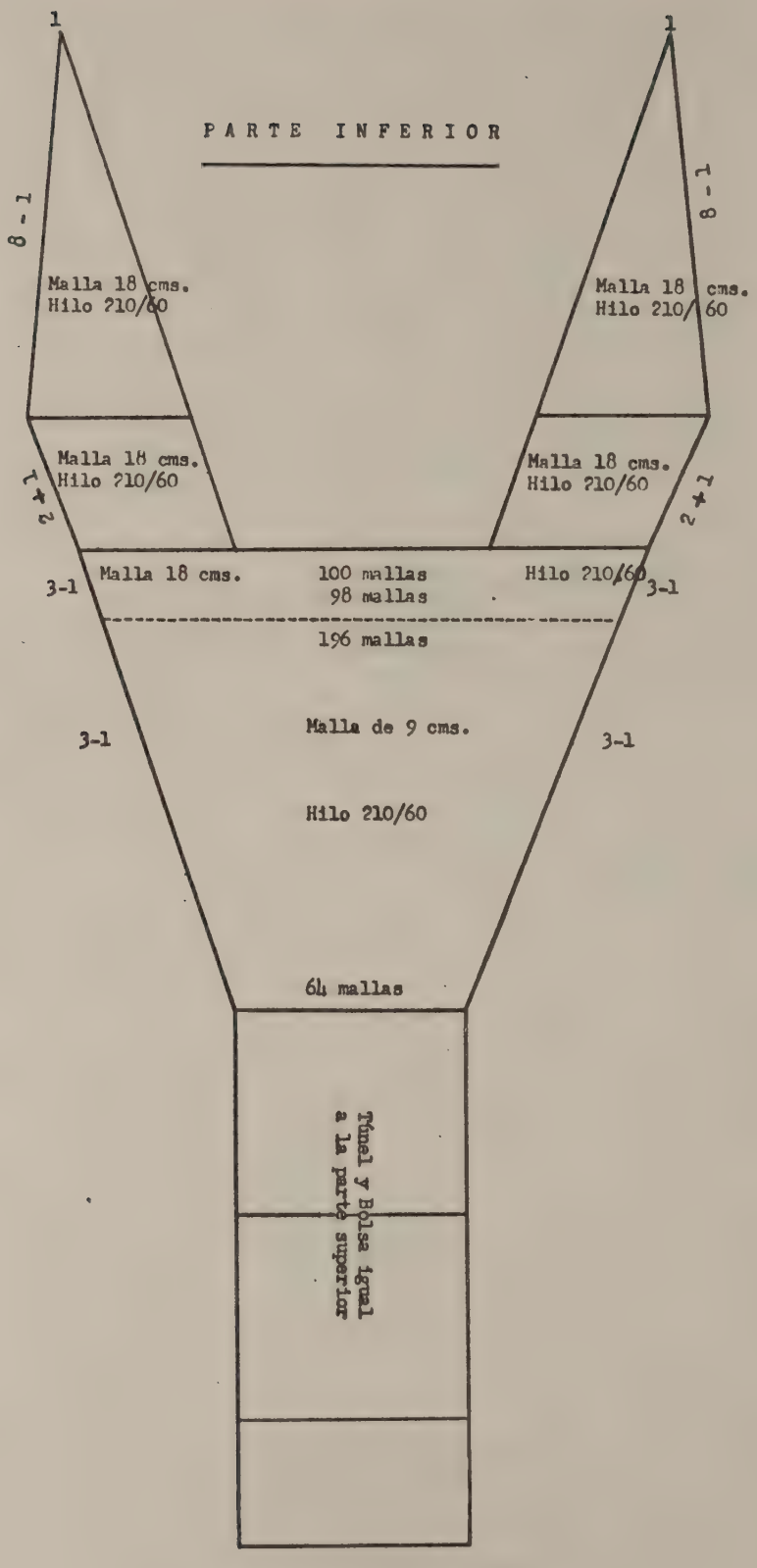
$\bar{X} = \frac{181692}{311}$ = 584.2 grams, mean weight

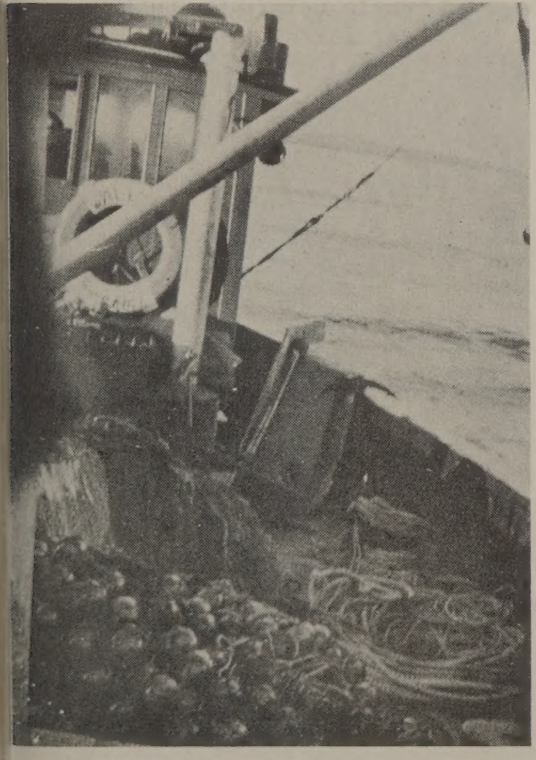
SURFACE WATER TEMPERATURES

Date	Hour	Location	Degrees Centigrade Air Temp.	Water Temp.
May 29	09:00	Puerto Palos, 1 mile West		± 6°
	11:00	Puerto Monmouth, 1 mile West		± 6°
	18:00	Puerto Chilota Channel		± 5°
May 30	09:30	Puerto Palos, 8 mile North, 50 fth.	± 3	± 6.5
June 6	10:00	Cape Monmouth, 2 mi SW, 60 fth.	± 3	± 6°
June 7	08:40	Puerto Chilota, Dock	± 1.5	± 3.5
	10:00	Puerto Palos, 4 mile NW	± 3	± 5
June 8	11:30	Puerto Palos, 4 mile North, 1 mile offshore	± 5	± 6
January 12	10:00	Puerto Palos, 2 mile NW	± 5	± 6
	12:00	Puerto Palos, 6 mile North, 3/4 mile offshore	± 8	± 6


PASO ANCH
MAGALLANES
Hobbs
Lago Serrono
LAGUNA VERDE
Lag. Larga
LAGO DE LOS CISNES
Estancia
Arroyo Ojos
Estero
San Antonio
Casa de Est.
CASA DE LATA
CO. TRABLAVIÑA
PORVENIR
Ba. Chilota
Ba. Porvenir
PTA. ZAHORRA
PUNTA PALO
PTA. SARA
PUNTA VICTORIA
PTA. MELENKA
Río Porvenir
Lag. Mac-Kay
CO. SANTA MARIA
CABO MONMOUTH
Lago Azul
Río Santa María
EA. SANTA MARIA
Laguna Borrosa
EA. MERCEDES
Río Rosa
CO. BOQUERON
Estancia BOQUERON
San Luis
PTO. BOQUERON
CABO BOQUERON
PASO DE LOS BOQUERONES
CABO VALENTIN
PUNTA ARSKA

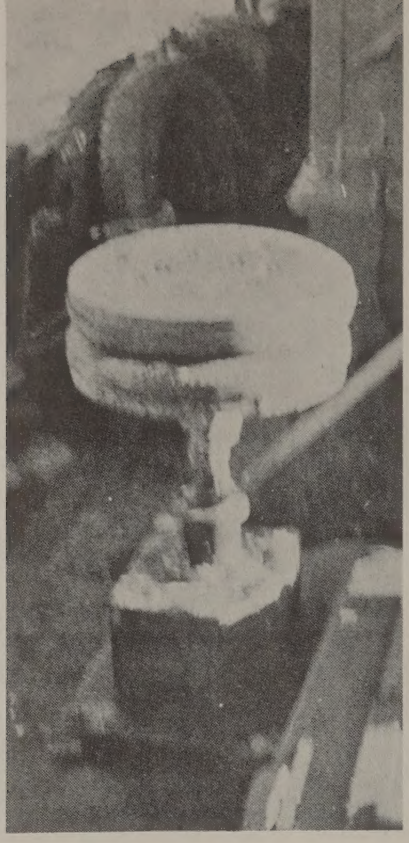

RED DE ARRASTRE DEL F.K."WALTER"
Parte superior
8 - 1
2 - 1
2 - 1
8 - 1
Malla 18 cms.
Hilo 210/60
45 mallas
40 mallas
45 mallas
Malla 18 cms.
Hilo 210/60
45 mallas
130 mallas
45 mallas
3 - 1
3 - 1
Malla de 18 cms.
Hilo 210/60
100 mallas
100 mallas
3 - 1
3 - 1
Malla 18 cms.
98 mallas
Hilo 210/60
196 mallas
Malla de 9 cms.
Hilo 210/60
3 - 1
3 - 1
64 mallas
80 mallas
Malla de 7 cms.
Hilo 210/96 sencillo
80 mallas
80 mallas
Malla de 7 cms.
Hilo 210/60 doble
80 mallas
Túnel: largo 8 mts.
80 mallas
Malla de 7 cms.
Hilo 210/96 doble
80 mallas
Bolsa: 3 mts.


1
1
PARTE INFERIOR
8 - 1
8 - 1
Malla 18 cms.
Hilo 210/60
Malla 18 cms.
Hilo 210/60
Malla 18 cms.
Hilo 210/60
Malla 18 cms.
Hilo 210/60
1 + 2
1 + 2
3-1
Malla 18 cms.
100 mallas
98 mallas
Hilo 210/60
3-1
196 mallas
Malla de 9 cms.
3-1
3-1
Hilo 210/60
64 mallas
Túnel y Bolsa igual
a la parte superior



1. M/V WALTER - chartered by Pesca y Caza for experimental Centolla fishing with traps, tangle nets, and trawl off Porvenir, Tierra del Fuego.

2. Tangle nets ready for setting.



3. Net gurdy aboard M/V WALTER used to lift tangle nets. 4. Removing Centolla aboard ship after tangle nets have been lifted. 5. Removing Centolla from tangle nets.

6. Lifting Centolla trap M/V WALTER. 7. Lifting cod end of trawl aboard M/V WALTER

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